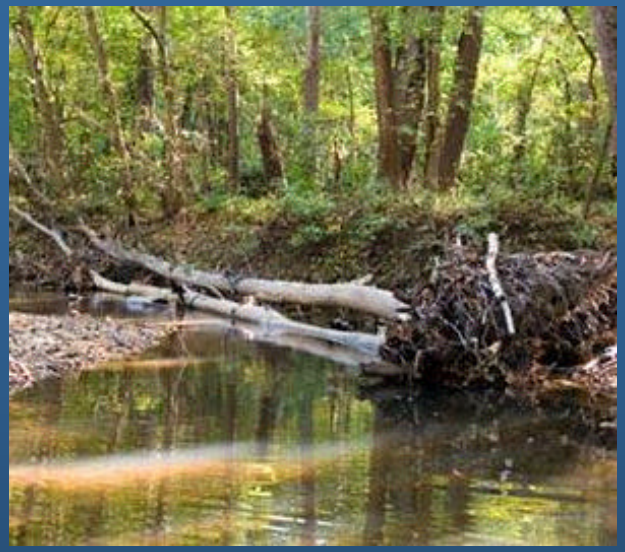
Total Maximum Daily Load Studies for Accotink Creek and Difficult Run



Technical Advisory Committee Meeting

July 17, 2007

Meeting Agenda

- **Water Quality Assessments and TMDL Process**

  Katie Conaway, VA Department of Environmental Quality
- **Bacteria and Benthic Source Assessment and TMDL Development**

  Raed El-Farhan, The Louis Berger Group, Inc.
- **Questions**

Why are we here?

- To learn about water quality in portions of Accotink Creek and Difficult Run
- To explain efforts that Virginia is undertaking to improve and protect water quality
- To learn what you can do to help

How do we know if water bodies in Virginia are healthy?

- **Perform physical and chemical monitoring on water bodies throughout the state**
- **Monitor parameters such as:**
  - **pH**
  - **Temperature**
  - **Dissolved Oxygen**
  - **Biological Community**
  - **Bacteria**
  - **Nutrients**
  - **Fish Tissues**
  - **Metals/Toxic Pollutants**

What do we do with the monitoring data that is collected?

Compare the data collected to the water quality standards

Water Quality Standards:

- **Regulations based on federal and state law**
- **Set numeric and narrative limits on pollutants**
- **Consist of designated use(s) and water quality criteria to protect the designated uses**

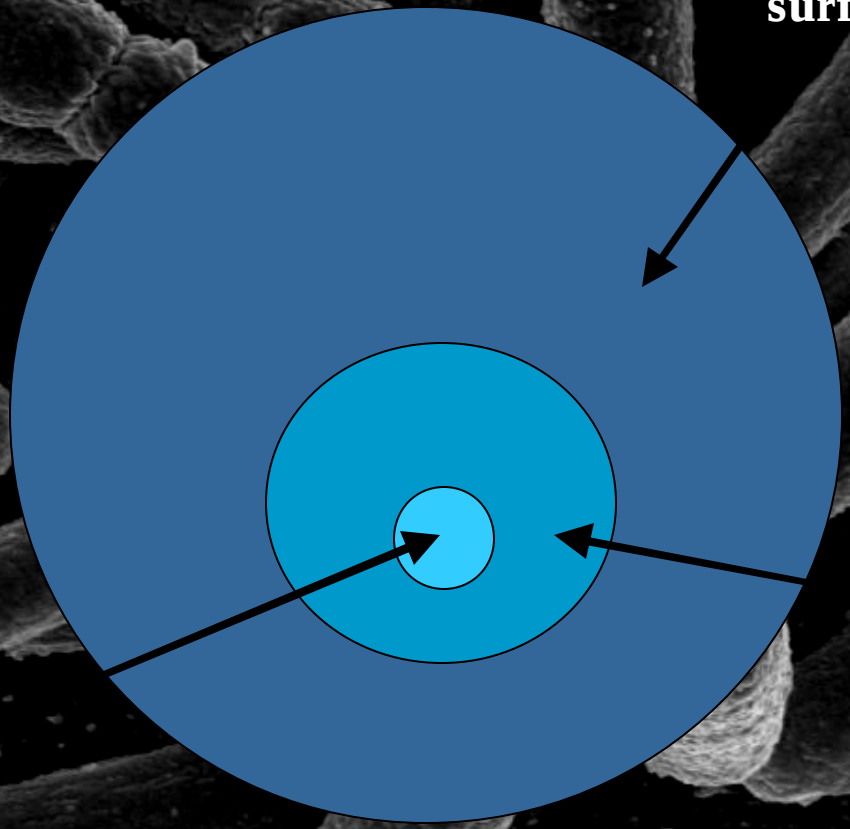
Designated Uses

- Recreational
- Public Water Supply
- Wildlife
- Fish Consumption
- Shellfish
- Aquatic Life

- The attainment of the recreational use is evaluated by testing for the presence of fecal coliform and *E. coli* bacteria.
- The attainment of the aquatic life use is evaluated by testing for the health of the benthic macroinvertebrate community, as well as for parameters such as DO and pH.

Recreational Use Impairment
What are Fecal Coliform and *E. coli* Bacteria?

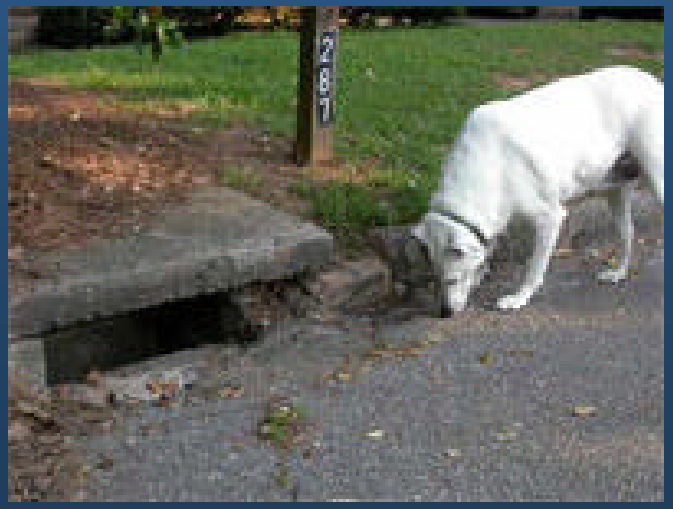
Coliform Bacteria:
Commonly found in soil, decaying vegetation, animal feces, and raw surface water



Escherichia coli:
- **Subset of fecal coliform bacteria**
- **Correlate better with swimming associated illness**

Fecal Coliform:
- **Found in the digestive tract of humans and warm blooded animals**
- **Indicator of the potential presence of pathogens in water bodies**

Potential Sources of Fecal Coliform Bacteria



What is the Water Quality Standard for Bacteria?

Indicator	Status	Instantaneous Maximum (cfu/100mL)	Geometric Mean (cfu/100 mL)
Fecal Coliform	Old	1,000	200
E. coli	New	235	126
Fecal Coliform	Interim	400	200

- **Changes went into effect on January 15, 2003.**
- **Both New *E. coli* and Interim Fecal Coliform criteria apply.**
- **Fecal coliform criteria will be phased out entirely once 12 *E. coli* samples have been collected or after June 30, 2008 (whichever comes first).**
- **In order for a water body to be listed as impaired:**
  - There must be at least two samples that exceed the water quality criterion.
  - Greater than 10.5% of the total samples must be exceedances.

Aquatic Life Use: What are benthic macroinvertebrates?

Aquatic invertebrates that live on the bottom of streams, rivers, and other bodies of water.

Why use benthic macroinvertebrates as an indicator of stream health?

- **Often live > one year – thus, they can show the effects of pollutants over a period of time, rather than just at one single moment**
- **Sedentary in nature – good indicators of localized conditions**
- **Live in the water for most, or all, of their life**
- **Are easy to collect and identify**
- **Differ in their tolerance to amount and type of pollution**
- **Show integrated effects of environmental conditions**

Aquatic Life Use Impairment: Benthic Macroinvertebrates

Pollution Intolerant Invertebrates

Mayfly

Stonefly

Caddisfly

Moderately Pollution Tolerant Invertebrates

Crayfish

Water Penny

Net spinning Caddisfly

Highly Pollution Tolerant Invertebrates

Midge Larvae

Segmented Worm

Leech

Questions?

What happens when a water body doesn't meet water quality standards?

- **Waterbody is listed as "impaired" and placed on the 303(d) list**
- **Once a water body is listed as impaired, a Total Maximum Daily Load value must be developed for that impaired stream segment to address the designated use impairment.**
- **TMDL Studies are required by law:**
  - **1972 Clean Water Act (CWA)**
  - **1997 Water Quality Monitoring Information and Restoration Act (WQMIRA)**

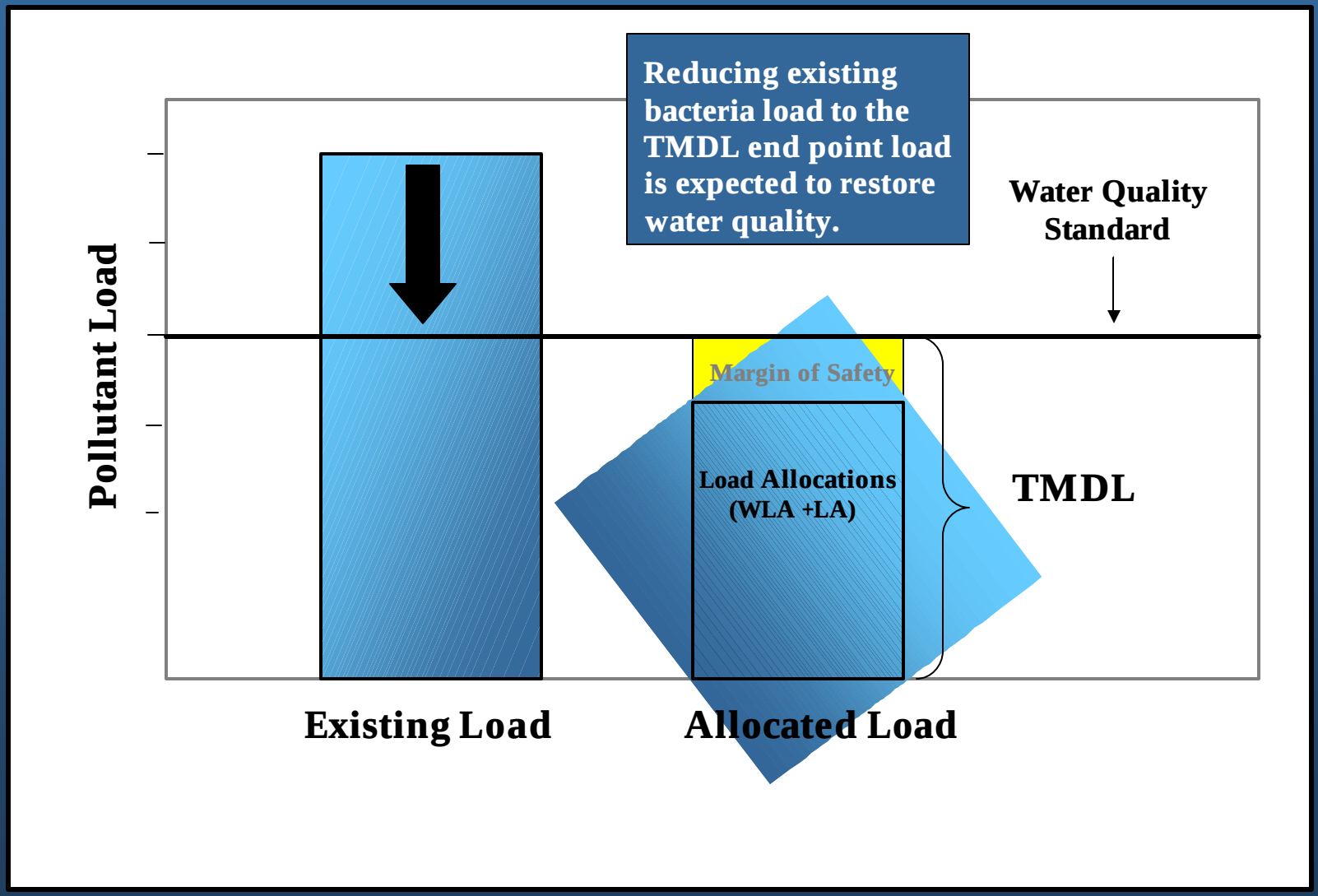
What is a TMDL ?
Total Maximum Daily Load

TMDL = Sum of WLA + Sum of LA + MOS

Where:

TMDL = Total Maximum Daily Load
WLA = Waste Load Allocation (point sources)
LA = Load Allocation (nonpoint sources)
MOS = Margin of Safety

An Example TMDL



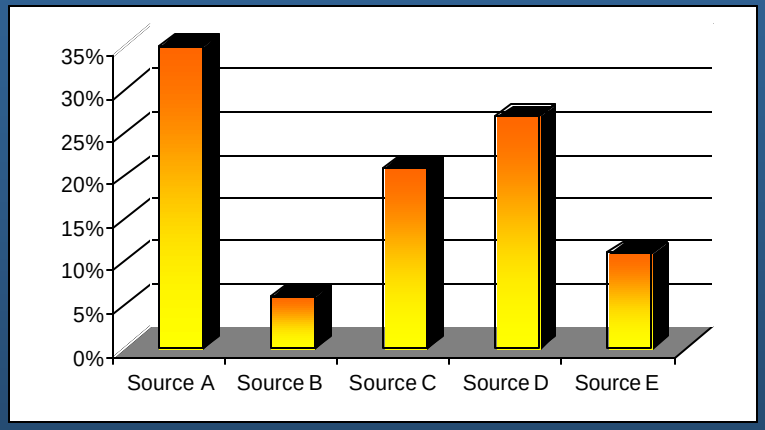
Required Elements of a TMDL

A TMDL must:

- **Be developed to meet Water Quality Standards**
- **Be developed for critical stream conditions**
- **Consider seasonal variations**
- **Consider impacts of background contributions**
- **Include wasteload and load allocations (WLA, LA)**
- **Include a margin of safety (MOS)**
- **Be subject to public participation**
- **Provide reasonable assurance of implementation**

TMDL Development Methodology

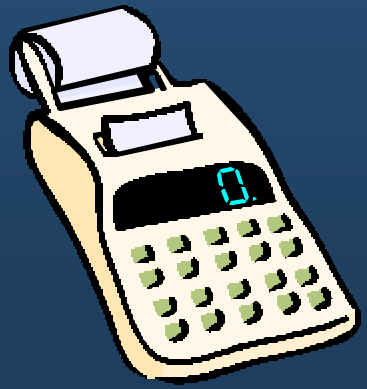
1. Identify all types of sources of a given pollutant within the watershed



2. Calculate the amount of pollutant entering the stream from each source type

3. Enter available data into a computer model. Model simulates pollutant loadings into the watershed.

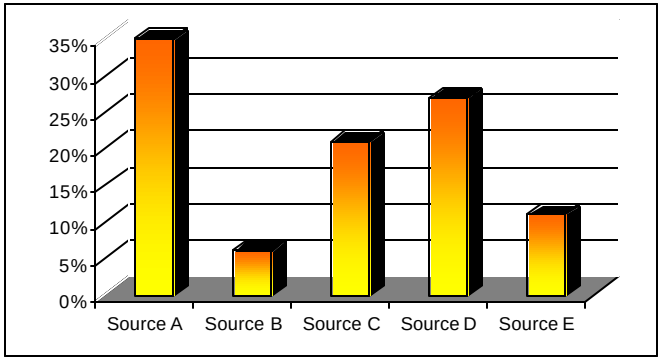
4. Use the model to calculate the pollutant reductions needed, by source, to attain Water Quality Standards



5. Allocate the allowable loading to each source and include a margin of safety

We are here

TMDL Study

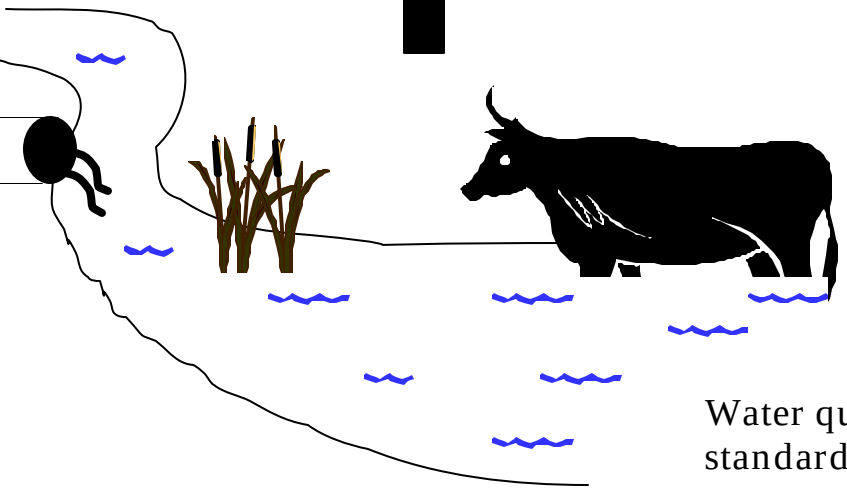


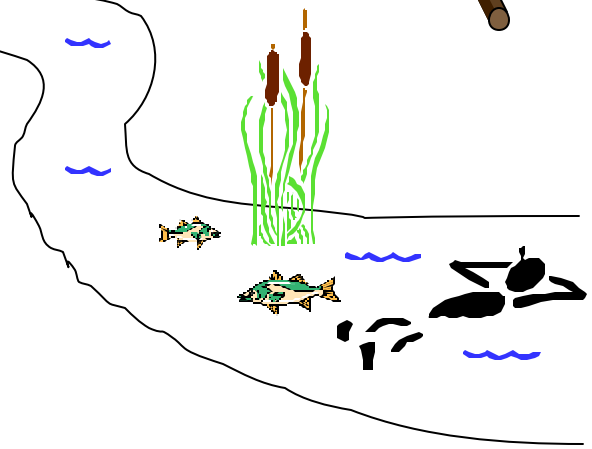
Implementation Plan

DCR

Implementation

Monitoring





Water quality standards not met

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